

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

CANISTER STORAGE BUILDING (CSB) STORAGE VAULT INSPECTION

Identification No.: RL-SNF08

Date: November 2000

Program: Spent Nuclear Fuel (SNF)

OPS Office/Site: Richland Operations Office/Hanford Site

PBS No.: RL-RS03

Waste Stream: SNF-02, Dry K Basins Fuel, (Storage Tubes and Vaults)

TSD Title: N/A

Operable Unit (if applicable): N/A

Waste Management Unit (if applicable): N/A

Facility: Canister Storage Building (CSB)

Priority Rating:

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" Priority:

- ☐ 1. Critical to the success of the ACPC
- ☐ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
- ☒ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Canister Storage Building (CSB) Storage Vault Inspection.

Need/Opportunity Category: *Technology Need* -- There is no existing or currently identified technology capable of solving the site's problem (i.e., technology gap exists, no baseline approach has been identified).

Need Description: A system that could be used to perform remote visual inspection (RVI) within the confines of Vault 1 at the Canister Storage Building (CSB) is needed during the interim storage period of the spent nuclear fuel. The system is to be used to check the long-term integrity of the canisters interim storage facility (i.e., CSB). Currently, no requirement for vault inspections exists; however it cannot be ruled out that some future upset conditions such as the occurrence of an earthquake would result in a desire to inspect the vault interior to confirm that no degradation resulted. Therefore, it is prudent for the SNF Project to perform advance planning for such inspections. Additionally, a determination of the most effective point-of-entry available to perform the examination is needed since currently no access into the vault exists or is planned.

Schedule Requirements:

Earliest Date Required: (10/2004)

Latest Date Required: (10/2010)

A system needs to be available to support inspection of CSB tubes and vaults in about 2004. This is when all of the multi-canister overpacks (MCOs) will have been placed in the tubes.

Problem Description: The Canister Storage Building (CSB) has been constructed in the 200 East Area of the Hanford Site to provide interim storage for spent nuclear fuel that will be removed from water-filled basins in the 100 K Area. The CSB is a 42,000-square foot, steel structure on a concrete operating deck. The building is 60 feet tall in its aboveground areas. Three heavily reinforced concrete vaults are located below grade, each capable of holding 220 carbon steel tubes. The tubes, each 40 feet long, have been emplaced vertically in Vault I of the building, the only vault that will be equipped and utilized by the SNF Project. An impact absorber system has been built into the base of each tube to prevent damage to an MCO in the unlikely event that one is dropped while being placed in the tube. The tubes will be accessed through tube plugs in the operating deck of the CSB. The tubes are ½ inch thick carbon steel, with a plate welded on the bottom. The exterior walls of the CSB are 4 ½ feet (54 inches) thick. The CSB floor is 5 feet (60 inches) thick reinforced concrete, and has more densely packed rebar than the walls.

The CSB facility itself is designed to operate for 40 years, and it is possible that remote visual inspections (RVI) may be required throughout that period. The purpose of the inspection is to examine the interior of CSB Vault 1 for visual indication of pooled/standing water, water ingress, degradation of concrete in the vault floor and structure, and deterioration of the multi-canister overpack (MCO) storage tubes. The intent is to examine the plenum area beneath the air inlet shaft, the front face of the MCO storage tubes and possibly a portion of the standard storage tubes. Inspection criteria (percent examination area, flaw-size detectable, RVI equipment performance, etc.) have not, however, been finalized.

The storage vault itself is specifically engineered to prohibit, rather than promote, entry, and was designed without consideration for repeatable access. These two factors increase the complexity of the task and will make the inspection difficult. Additionally, there are no orientation landmarks or directional indicators within the vault to provide a visual reference, and the storage tubes themselves are not individually identified.

Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation: Baseline for outyear operating costs for the CSB are not fully established at a level that would provide an estimate that could be required for this activity. A rough order of magnitude (ROM) cost for this activity is \$200K. Improved technology could reduce cost by roughly 50% for a savings of \$100K.

Benefit to the Project Baseline of Filling Need: RVI equipment provides a means to visually examine the interior of normally inaccessible areas and eliminates the need for human entry into

hazardous environments. By employing specialized optical-mechanical devices, an operator can perform such inspections at a safe distance away from associated work hazards.

Relevant PBS Milestone: N/A

Functional Performance Requirements: The operating environment within Vault 1 will be both thermally and radiologically hot, therefore, an inspection performed remotely will be required. Minimum size of visual detectability and extent of coverage (examination area) to be inspected have not been finalized.

Work Breakdown Structure (WBS) No.: **TIP No.:**

1.03.02.01.20 N/A

Justification For Need:

Technical: It cannot be ruled out that some future upset conditions such as the occurrence of an earthquake would result in a desire to inspect the vault interior to confirm that no degradation resulted.

Regulatory: There is no regulatory requirement for this technology need.

Environmental Safety & Health: There are no environmental safety and health issues of concern with this technology need.

Cultural/Stakeholder Concerns: The Defense Nuclear Facilities Safety Board (DNFSB) staff raised the issue of performing inspections of Vault 1 at the CSB.

Other: None identified.

Current Baseline Technology: N/A

End-User: Canister Storage Building

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